



2017

ANNUAL REPORT

RICC | Regional Industry
Caribou Collaboration

The Regional Industry Caribou Collaboration (RICC) is a group of energy and forestry companies working collaboratively across tenure and lease boundaries to coordinate habitat restoration, conduct research on caribou ecology and landscape relationships, and lead investigative trials on landscape restoration methods and effectiveness (i.e., vegetation establishment and wildlife responses).

We focus on two northeastern Alberta caribou ranges:

The Cold Lake range and the East Side Athabasca River (ESAR) range.

These ranges overlap substantially with RICC members' oil sands and forest management operations in the area. RICC became a Canada's Oil Sands Innovation Alliance (COSIA) Joint Industry Project in 2015.

Learn more about our work and how to become a member at:

www.cosia.ca/initiatives/land/regional-industry-caribou-collaboration

RICC | Regional Industry
Caribou Collaboration

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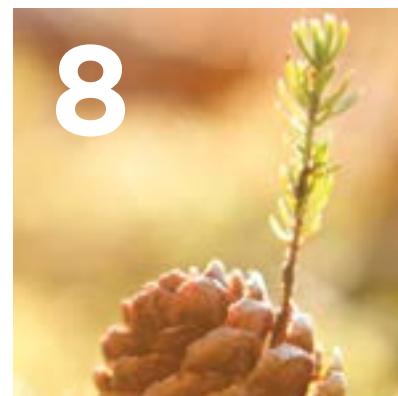
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THE CARIBOU STORY

Rangifer tarandus caribou (Boreal population)

Boreal woodland caribou are wide-ranging animals whose annual home ranges cross company leases and various land-use types. Their populations are listed as threatened under Canada's Species at Risk Act (SARA). Many complex and interconnected factors are contributing to the decline of boreal caribou, including both natural and human-caused landscape changes, which are indirectly contributing to increased predation on caribou.

To increase chances of achieving self-sustaining populations, the Federal Recovery Strategy¹ estimates that at least 65% of a caribou range should be undisturbed, with disturbance defined as human footprint plus a 500 m buffer, along with areas that have been burned in the last 40 years. As of 2017, boreal caribou ranges across northeastern Alberta were between 9% and 16% *undisturbed*.²

RANGE-LEVEL MITIGATION

Government and industry alike have recognized that conservation is a shared government, public and private sector responsibility. Lease-specific mitigations undertaken by companies are important to minimize local impacts on individual animals, but more population-level benefits stem from range-level mitigations that require collaboration. RICC enables range-level caribou recovery efforts that pre-date, but now align with and support the Draft Provincial Woodland Caribou Range Plan.

1. Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada, Environment Canada, 2012.

2. Draft Provincial Woodland Caribou Range Plan, Government of Alberta, 2017.



MISSION

Enable the restoration of caribou habitat and recovery of their populations through collaborative, range-based efforts



GOAL

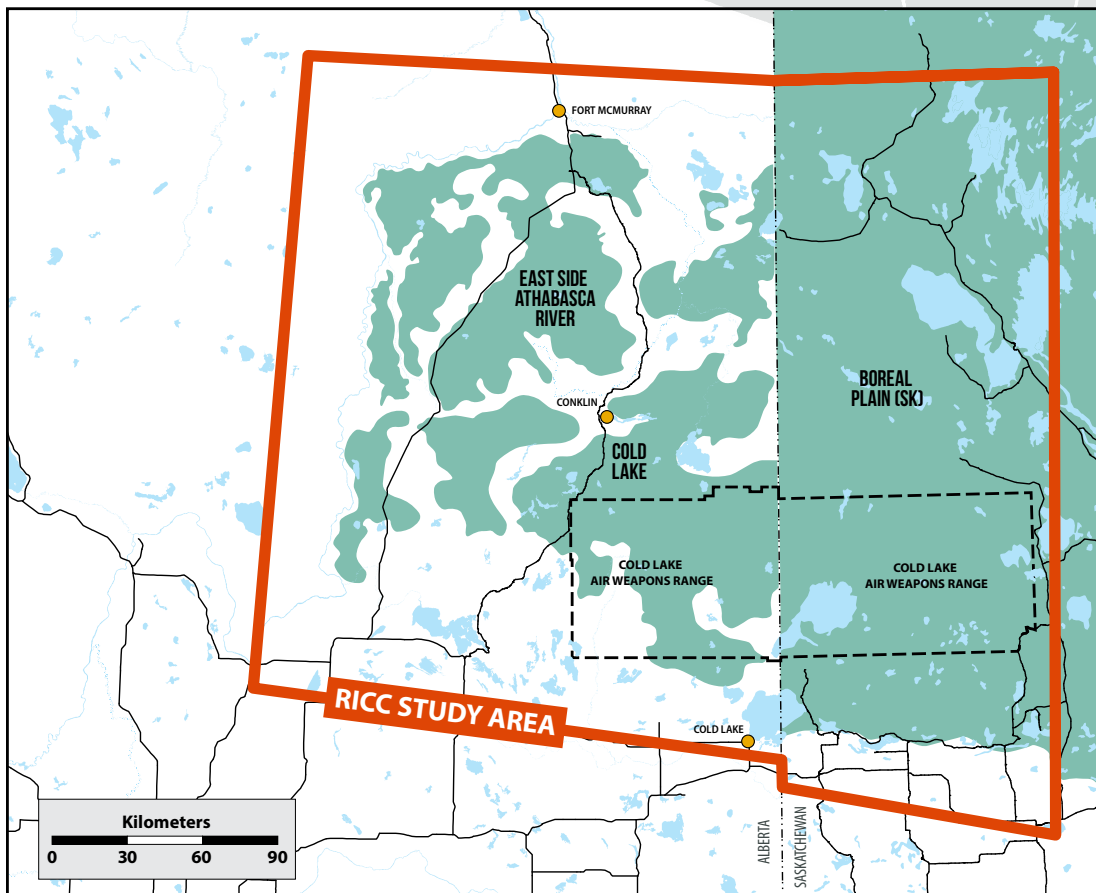
- ▶▶▶ Participate in collaborative research and active, science-based adaptive management activities within the defined RICC study area

OBJECTIVES

- ▶▶▶ Coordinate industry restoration of disturbance in priority areas
- ▶▶▶ Support and lead scientific research on caribou ecology and on caribou-predator-landscape relationships to identify priority issues and/or priority areas
- ▶▶▶ Support and lead investigative trials on restoration methods, effectiveness, and wildlife responses, and make recommendations for broader implementation

WOODLAND CARIBOU RANGES

-  Geographic distribution of woodland caribou, boreal population in Canada
-  Regional Industry Caribou Collaboration study area covering approx. 85,000km² across Alberta and Saskatchewan



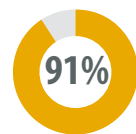


The RICC study area covers approximately 85,000 km² in the Cold Lake and ESAR boreal woodland caribou ranges, and parts of the boreal forest in adjacent Saskatchewan which serves as a reference environment. The study area also includes a 20 km buffer around the Alberta caribou ranges to incorporate adjacent areas that may impact woodland caribou within their ranges. The ESAR and Cold Lake caribou populations are currently in decline. As of 2017, the ESAR and Cold Lake ranges were 90% and 91% *disturbed*, respectively, according to the Draft Provincial Woodland Caribou Range Plan, Government of Alberta, 2017.

PERCENTAGE OF RANGE DISTURBED
per Draft Provincial Woodland Caribou Range Plan,
Government of Alberta, 2017



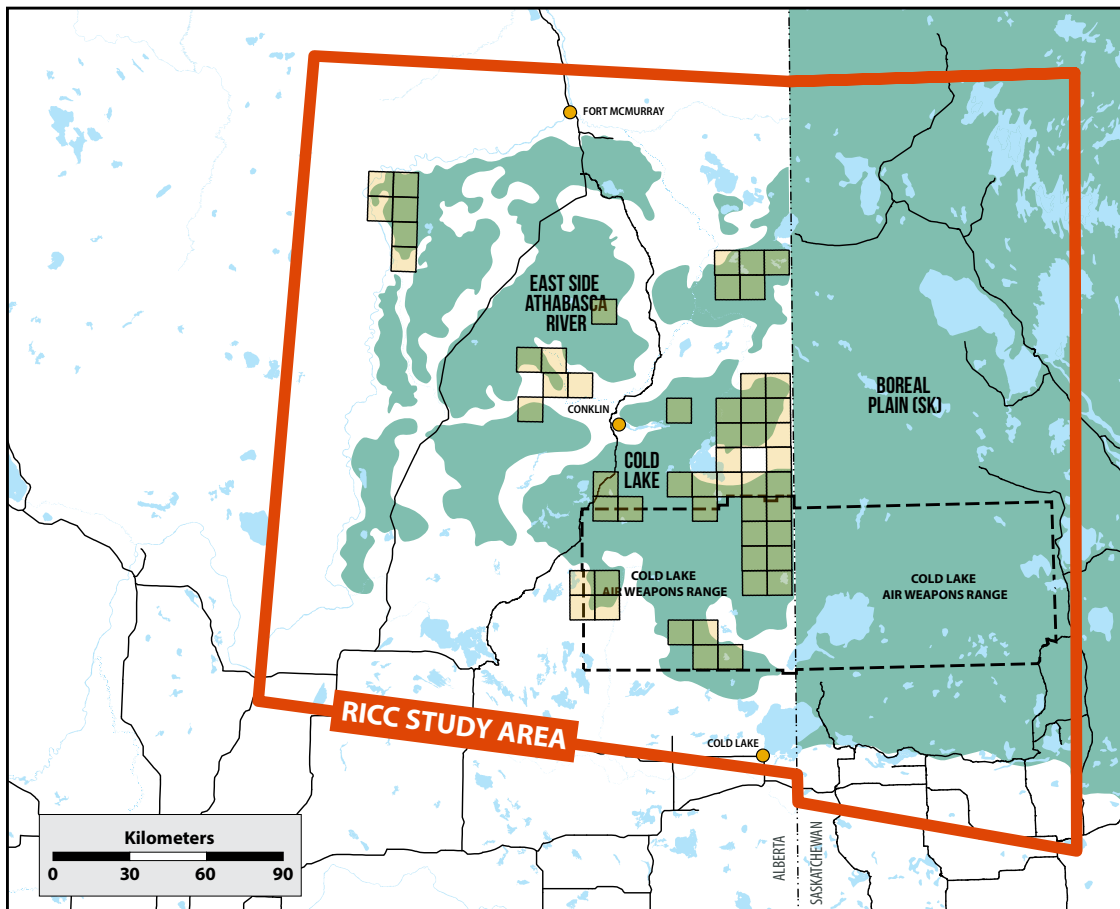
ESAR



COLD LAKE

A FOCUS ON RESTORATION

Until recently, habitat restoration has been conducted locally at a small scale on individual company leases and dispositions, primarily to meet company-specific regulatory requirements. While companies are continuing with those lease-focused initiatives, RICC brings companies together to do more, by coordinating habitat restoration across and beyond these leases, and by leading research and trials on restoration methods, effectiveness and wildlife responses. This work has been led by RICC members or contributed to the RICC group for broad implementation over the past five years. Together, we can have a bigger impact on caribou recovery than going it alone.



■ TREATMENT AREAS TO DATE

By the end of 2017, RICC members had implemented restoration treatments on **over 1,000 linear kms of legacy seismic lines** across the Cold Lake and ESAR caribou ranges.

TREATING LEGACY SEISMIC LINES 1 KILOMETRE AT A TIME

Here are some examples of how we're doing it:

MOUNDING

Mounding is the practice of digging shallow holes and placing the soil beside the hole to make an elevated 'mound'. These mounds have higher soil temperature and reduced water inundation, thus creating microsites with good growing conditions for trees. In the Cold Lake and ESAR ranges, RICC companies have employed mounding as a treatment on most restoration projects.

STAND MODIFICATION / STEM BENDING

Trees beside the open line are bent over the line to protect seedlings and create barriers for human (and wildlife) access. This technique was applied to the Linear Deactivation (LiDea) pilot project between 2013 and 2015 led by Cenovus Energy, comprising mounding and stand modification/stem bending, prior to the planting of seedlings. The LiDea technique was shared with members of Canada's Oil Sands Innovation Alliance (COSIA). Cenovus continues to use its LiDea restoration technique for its large-scale, 10-year Caribou Habitat Restoration Project.

TREE-PLANTING

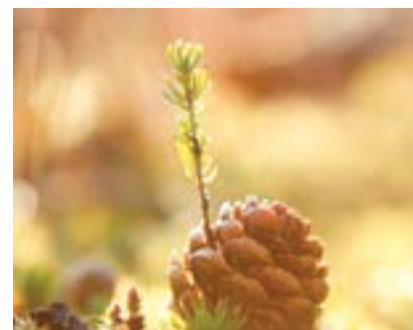
Tree planting usually occurs in the summer using seeds and transplanted seedlings. Together, RICC members have planted over 1 million seedlings since the start of the partnership.

LINE-BLOCKING

Line-blocking involves installing material to block line-of-sight for animals and humans looking down the lines and to discourage animals from moving along the lines. In one trial, line-blocking by dropping logs and timber across the line was implemented on 5.9 km of legacy linear features in the ESAR caribou range.

AMPHIBIOUS VEHICLES

The use of amphibious vehicles with low ground pressure was tested to access wet areas. These vehicles are accessorized to travel across very wet muskeg and even open water areas without sinking or creating ruts. The ability to access and treat seismic lines in the wet summer months effectively allows year-round restoration activities, rather than only when the ground is frozen. In a COSIA project amphibious vehicles and low ground-pressure equipment were used to treat 204 km of linear features under non-frozen conditions within the RICC study area.



Understanding the factors contributing to caribou decline

The reasons for caribou decline are complex and interrelated. Boreal caribou habitat is fragmented by human footprint, including roads, oil and gas development, timber harvesting, agricultural clearing and recreational access. It is believed a warming climate is also leading to expanding deer and moose populations, which in-turn support higher densities of wolves. Together, landscape changes and a warming climate contribute to increased predation on caribou in northeastern Alberta. But what is the relative importance of each of these factors to caribou declines?

2017 PROJECTS



Devon Canada © 2017

WILDLIFE MONITORING

Completed the first phase of monitoring bears and wolves to understand how human disturbance and natural habitats are influencing the behaviour of these species. This data will act as baseline information to compare future data after various management strategies have been employed.

Research Project

WOLF SPACE-USE RESPONSE TO DISTURBANCE

Launched a research project focused on determining if **wolf territories** are smaller in areas where they have access to more linear features. We would expect wolf home ranges to shrink in areas where wolves are able to hunt more efficiently, allowing them to defend smaller territories and thereby increase the density of wolf home ranges resulting in more wolves hunting caribou. Data was collected from 17 packs that range in linear feature density from 0.06 km/km² to 2.11 km/km² based on Environment Canada 2011 data, and will evaluate the relationship between home range size and linear feature density. Future work will build on these relationships, and include information about prey density.

RICC works closely with academia, various industry sectors and service providers to better understand the role of the industrial sectors in shaping animal space-use and behaviour. This knowledge will inform management strategies for the RICC Study Area and will contribute to the broader understanding of caribou declines.



Understanding how species respond to management strategies

2017 PROJECTS



ECOSYSTEM MONITORING CAMERA PROGRAM

Launched in 2017 to monitor the responses of multiple wildlife species to caribou management strategies, and the relative influence of disturbance versus climate on species density. As management activities (habitat restoration, predator management, etc.) are implemented in northeastern Alberta, it is important to understand how those activities (and combination of activities) influence a broad range of species, including wolves, bears, moose, and deer.

RICC is working with the Alberta Biodiversity Monitoring Institute's (ABMI) Caribou Monitoring Unit and the Government of Alberta to monitor densities of ungulates, predators, and other mammals in areas with predator management (East Side Athabasca River range), in areas with predator management and habitat restoration (Cold Lake range) and in areas with no active management activities (West Side Athabasca River range). In addition, these results will be contrasted with an area with little human disturbance (Saskatchewan boreal plains), to understand the relative influence of climate and disturbance on mammal densities and trends over time.



Defining restoration goals

Restoring forest cover is an important component of caribou recovery; however, defining forest cover is not an easy task. Range disturbance values have been identified in the Federal Recovery Strategy based on the use of coarse satellite imagery. Alberta, in contrast, has developed a more detailed picture of disturbance in the province using more fine-scale data. Furthermore, not all disturbances influence vegetation equally, and may not contribute to caribou declines equally. More research is necessary to understand how different types of disturbances, using both the provincial and national data sets, influence caribou and other species interactions with the environment. This understanding is important in defining recovery for individual ranges and management jurisdictions.

2017 PROJECTS

Research Project

CARIBOU USE OF BURNED AREAS

The Federal Recovery Strategy considers all areas within burns (identified using coarse satellite data) to be **disturbed caribou habitat**, even spots that did not burn. However, recent research suggests that caribou may use these residual unburned patches. University of Alberta graduate student Sean Konkolics is evaluating how caribou use unburned patches within fire boundaries, as it is important to understand how the use of these unburned patches influence caribou population dynamics and range disturbance calculations.

Research Project

HOW MOOSE USE BURNED PEATLANDS

Increases in moose populations can lead to an increase in caribou's natural predators, wolves and bears, thereby furthering caribou decline. University of Alberta researcher Dr. Craig DeMars is evaluating whether moose use peatlands after they have burned, and how fire intensity influences how moose interact with the environment. If moose avoid post-fire peatlands, these areas would not directly facilitate increases in moose populations and their inclusion in range-level calculations of disturbance should be questioned.

Research Project

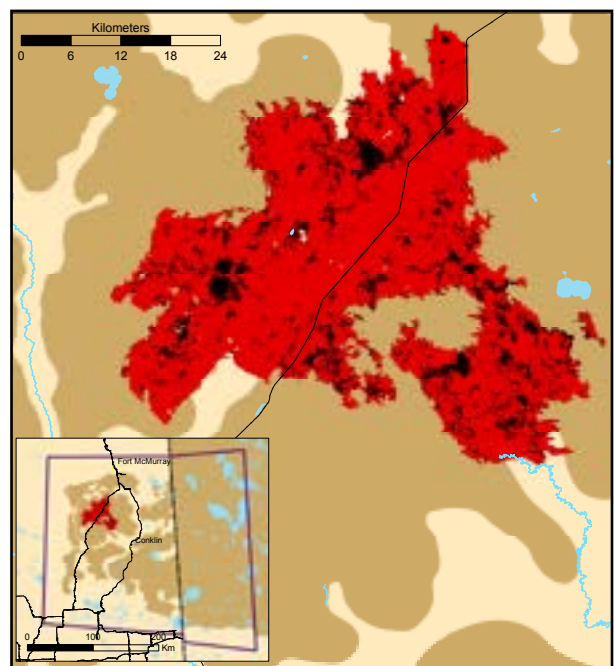
THE INFLUENCE OF FIRE ON SEISMIC LINE RECOVERY

University of Alberta graduate student Sean Konkolics initiated a project to understand how fires influence seismic line recovery to determine if fires speed the recovery of disturbances in the boreal forest. As fires become more frequent with predicted warmer, drier weather, this will be important when estimating future recovery trajectories as well as prioritizing areas for restoration.

Completed Research Project

DEFINING FUNCTIONAL RESTORATION

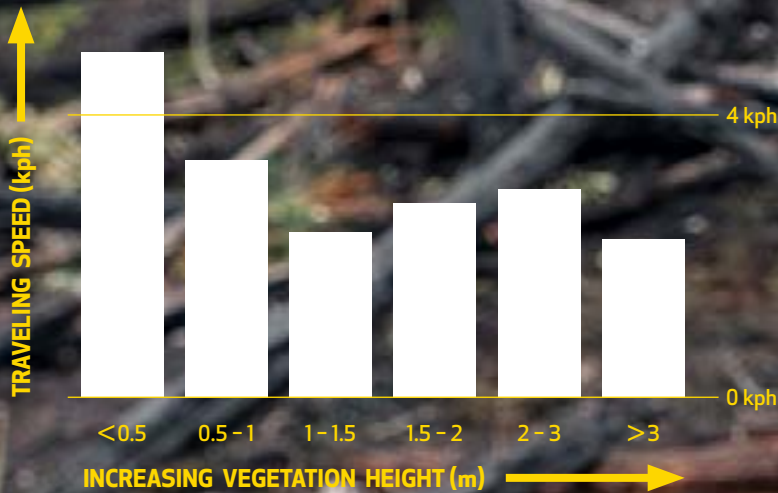
Linear features such as seismic lines and roads allow predators to move faster, thereby increasing encounters with their prey. Therefore, to adequately track restoration, it is important to understand how recovery influences **wolf movement behaviour**. Researcher Melanie Dickie found that both wolf selection for linear features and wolf travel speed while on these features decreased with higher vegetation. Wolf speed on lines wasn't equal to that of the surrounding forest until the vegetation height reached 4.1 m. However, wolf movement on linear features substantially decreased once the vegetation exceeded 50 cm high. This means that seismic lines with 50 cm of vegetation growth are already starting to contribute to reduced wolf movement.



SEAN KONKOLICS FIRE STUDY

Detailed map of the 2002 House River fire in the ESAR. Red represents the burn matrix and black signifies unburned residual patches.

Wolves are
2-3x
faster on
seismic lines



Wolf travel speed on seismic lines in the summer, in upland forests. Once vegetation height reaches 50cm, wolf travel speed is considerably reduced.

photo credit: FRANCO ALO

Understanding how human disturbance and fires contribute to boreal caribou decline is important when it is applied to prioritizing management strategies. For example, if fires do not reduce caribou habitat use or survival, restoration efforts could instead focus on areas outside of burns to most efficiently use conservation resources. Likewise, understanding how animals use disturbances at various stages of recovery will help to set achievable recovery targets.

TRACKING RESTORATION

Tracking restoration

Traditionally, restoration activities have been tracked using different metrics and methods across companies and government. Establishing accurate, precise and meaningful metrics to track restoration activities and recovery targets will align industry and give us a better understanding of the state of boreal caribou habitat.

PROJECTS

Research Project

TRACKING THE STATUS OF LINE REGENERATION ACROSS THE OIL SANDS REGION AND ALBERTA-PACIFIC FOREST INDUSTRIES INC. FOREST MANAGEMENT AGREEMENT AREA

As restoration activities continue across northeastern Alberta, it is important to document the current status of vegetation on disturbances, prioritize restoration activities, and evaluate progress. Research by the Caribou Monitoring Unit will determine how functional restoration (See “Defining functional restoration”) translates to coarser, provincially available data describing vegetation structure like Light Detection and ranging (LiDar). Using the relationships between these two datasets, the CMU will evaluate the current status of vegetation regeneration across the oil sands region in the context of wolf movement behaviour. This will provide one piece in the puzzle to identifying lines for restoration and tracking restoration progress over time.

Research Project

COLLABORATION WITH BERA TO DEVELOP TOOLS TO MONITOR VEGETATION ON DISTURBANCES

In 2017 RICC began a collaboration with the Boreal Ecosystem Recovery and Assessment (BERA) project to develop a monitoring program of vegetation recovery and restoration using remote sensing. Monitoring of restoration treatment was conducted on previously restored seismic lines within the RICC study area. The project team is located at the University of Calgary.

Coordinated and targeted restoration across company dispositions and leases is vital for caribou recovery. Conducting restoration on a large enough scale to influence the woodland caribou and reduce disturbance levels on caribou ranges will require substantial effort. Understanding how to best implement and track these efforts is key for effective and efficient restoration across the landscape.



CHECKING OUR SCIENCE

EXTERNAL REVIEW

RICC commissioned an independent program review by external third parties. The primary objective of the external review was to critically evaluate the scientific and technical merits of the research and monitoring foundations of RICC and to identify strengths and recommend improvements or changes to those elements or to the implementation approach.

The reviewers' finalized their report in spring 2017. The reviewers concluded that the RICC program serves *"as an excellent model for ongoing efforts to address the challenge of habitat restoration"* elsewhere. Identified strengths of the RICC program included: the multi-scale approach; testing of different restoration techniques; and coordinated monitoring of vegetation, predators, alternative prey, and caribou. *"Together these should provide considerable insight into the proximate and ultimate causes of caribou decline and opportunities to mitigate these."*

RICC was advised that its activities and data collection should be strategically-focused on:

1. functional restoration of anthropogenic disturbances;
2. evaluation protocols for success of these techniques for vegetation recovery and animal response;
3. a process to identify where restoration will be most effective and beneficial; and
4. a process to quantify and summarize the current and projected state of habitat restoration treatments, including recognition of partial recovery.



Regional Industry Caribou Collaboration members work with academia, the Government of Alberta and the Alberta Biodiversity Monitoring Institute (ABMI) Caribou Monitoring Unit on an ongoing basis. Learn more about our work and how to become a member at:

www.cosia.ca/initiatives/land/regional-industry-caribou-collaboration

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